# SMART DIESEL PARTICULATE MONITORING SOLUTIONS

**The Ultimate Vehicle Exhaust Test Systems**

**Simultaneous Measurements of 5 Different Particle Size Fractions**

**Designed for Testing Vehicle Exhaust DPM Emissions**

TSI'S NEW GENERATION OF VEHICLE EXHAUST DPM TEST SYSTEMS ARE SIMPLY THE SMARTEST AND MOST TECHNICALLY ADVANCED SYSTEMS OF THEIR TYPE. UNLIKE OTHER COMPETITIVE INSTRUMENTS, TSI DPM TEST SYSTEMS INCORPORATE LATEST GENERATION STATE-OF-THE-ART LASER PHOTOMETERS THAT HAVE BEEN FINELY CALIBRATED TO MAKE HIGHLY ACCURATE & VALIDATED MEASUREMENTS.

With superior optics and particle detection system, TSI's DPM test systems also offer accuracy and resolution down to **1ug/m3** versus 100ug/m3 (0.1mg) or worse on some competitive systems. That is a factor of 100 times better resolution when compared to some competitive systems.

TSI systems represent the very latest technology with all **digital** signal processing and a USB interface versus old RS232 still found on some competitive systems. TSI systems also provide a multitude of popular latest generation communication options, including Ethernet, 4-20mA, voltage outputs, a relay contact closure & USB for connection to almost any data logging, SCADA or telemetry system. The AVT533 represents rock solid and constantly evolving technology. It is simply the smartest investment for any organisation undertaking exhaust diesel particulate measurements.

Another great feature of the AVT533 is the built-in 60,000 point data logger, allowing clients to log and later view or print out test results. Our systems also feature a large 5.7" touch screen graphical VGA color display, variable flow rate (up to 3 lpm) for better particle transport, a built-in latest generation 10:1 dilution system, a precision thermal conditioner, impressive 5 hour operation time and many other popular enhancements.

Proper **calibration** of any optical electronic device of this type is absolutely paramount to ensure accurate, reliable & repeatable measurements. Kenelec Scientific has decades of experience with optical electronic particle counting and sizing instruments. With advanced service facilities and full **NATA** & **ISO21501** accreditation in the calibration of optical particle counting / sizing instruments, no other company comes close to matching the experience and capabilities that Kenelec Scientific offers in Australasia.

Checking flow rates or using zero filters in the field is not enough. In following global standards, all instruments of this nature need to be calibrated on an annual basis, in the laboratory by experienced optical electronic technicians. Unlike some competitive companies that send equipment overseas for repairs or calibrations or do sub standard calibrations / verifications in the field, Kenelec Scientific sells, services, fully calibrates and **supports** all of our systems locally in Australia to the highest possible standards.

## TSI AVT533 ADVANCED DPM TEST SYSTEM

### Standard Features Include

- 100nm to 15um particle size range
- 10:1 advanced dilution system for DPM measurements
- Built-in thermal conditioner for DPM measurements
- 0.001 to 1,500mg/m3 particle concentration range (10:1 dilution)
- Fully compliant with both **DNEPM** & **MDG29** Australian guidelines
- Uses the latest 90 degree light scattering technology
- **0.001 mg/m3** high resolution measurements
- Built-in pump, 3 lpm flow rate, (variable from 1.4 to 3 lpm)
- 3 lpm flow rate providing better particle transport
- 60,000 point data storage (once a minute for 45 days)
- 5.7 inch real-time VGA colour graphical touch screen display
- Fully menu driven and easy to use
- Excellent correlation with laboratory reference instruments
- Patented sheath air system & recessed optics
- Developed in Australia for regulators & industry professionals

### Enhanced Features Include

- Built-in **water pump** to eliminate water / moisture problems
- Handles exhaust temperatures up to 500 degrees C
- Suitable for steady state or transient test measurements
- 60 second smart auto zero function (done before each test)
- Operates for up to **5 hours** off internal battery
- Additional 12 volt DC power input connection
- 240 volt mains powered operation, charger supplied
- Includes powerful Windows based analysis software
- Results expressed as **elemental carbon** in ug/m3 & mg/m3
- 5m long sample hose to comply with industry standards
- Rugged dust proof, water resistant, NEMA 4 enclosure
- Field adjustable calibration factor adjustments / capabilities
- Optional SMS & Email messaging & remote telemetry
- Single operator use, quick disconnect sample probe

### Service, Support & Calibration

- Fully serviced and supported in Australia by Kenelec Scientific
- Fully calibrated both optically and electronically to **ISO12103-1** international standards by Kenelec Scientific
- Kenelec Scientific is Australia's leading **NATA** accredited and fully **ISO21501** compliant NATA calibration laboratory
- Lifetime FREE technical support, rental options available
- Lifetime FREE firmware and software updates

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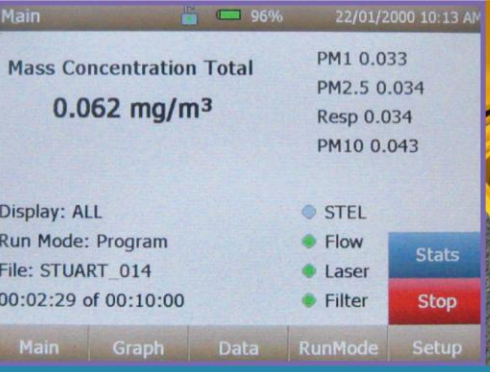

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**Rugged Design & Housing**
Unlike some other systems on the market, the AVT533 is ruggedized and is fully enclosed in a NEMA 4 enclosure in order to withstand the harsh environmental conditions in the mining & transport industry. It is water resistant, dust proof and all of the necessary thermal conditioning, dilution, signal processing and real-time reporting is is done in the one smart portable enclosure.

**Smart Messaging & Telemetry Options**
The AVT533, utilizing optional plug in modules, is even capable of sending SMS and email messages to mobile devices and PC's (via the internet) on DPM alarm alerts. It can also transmit valuable measurement data back to mobile devices and PCs via the internet for remote data storage and analysis. Network connections include 3G / NEXTG mobile, underground mesh and others.

**Constantly Evolving Technology**
Modular design, free updates, numerous add ons, plug-ins and accessories available

**Communications**
- USB 2 interface for PC connection and manual data download
- Data dump straight to any USB flash drive
- Field programmable firmware updates (all models)
- Ethernet port for remote control and access to data

**Outputs & Alarms**
- Internal audible & visual alarms to warn users
- 0 to 5 VDC or 4-20mA (optional)
- Fully user selectable scaling range
- Relay contact closure for local alarms, lights, buzzers etc (optional)
- Local warning lights and sirens available (optional)
- SMS messaging on alarms on SMS & remote capable systems

**Telemetry & Data Access Options**
- Manual download using any USB flash drive
- 3G / NEXTG mobile network data access capabilities
- Underground mesh network back to base capabilities
- SMS & Email messaging with optional hardware update
- Full data access using internet & web browser
- Internet data collection plans available from only $20 per month

## SPECIFICATIONS

### Protective Enclosure

**Physical**

| | |
|---|---|
| Enclosure style | NEMA 4 |
| Dimensions | 21 x 43 x 52 cm |
| Total system weight | 16kg (with battery) |

**Internal Battery System**
1 x 12 volt internal, 10Ah NiMH battery. Provides approximately 5 hours of continuous in field operation between charges. 12v DC input also

**Sampling Conditions**
0 to 500 degree C temperature
0 to 95 % relative humidity
-20 to 60 degree C instrument storage

**Standard Description**
Water resistant, dust proof, NEMA 4 enclosure with pressurization valve, O-ring seal, easy open double throw latches and solid wall design

### Optional Tripod Stand
6.3 kg weight
Heavy duty hardwood construction
Flat head with screw clamps
Entendable height from 1.1m to 1.7m

### Measurement Device

**Primary Sensing Device**
TSI 8533-DPM new generation laser photometer with patented sheath air system and recessed optics

**Sensor Type**
90° light scattering

**Particle Size Range**
0.1um to 15 µm

**Particle Size Sensitivity**
0.1um to 500um

**Flow Rate**
3.0 L/min set at factory, 1.40 to 3.0 L/min, user adjustable

**Flow Accuracy**
±5% of factory set point, fully internal flow controlled

**Particle Concentration Range**
0.001 to 1,500 mg/m3 (elemental carbon)

**Measurement Resolution**
±0.1% of reading or 0.001 mg/m3, whichever is greater

**Zero Stability**
±0.002 mg/m3 per 24 hours at 10 sec time constant

**Temperature Coefficient**
+0.001 mg/m3 per °C

**Internal Display**
5.7 inch VGA touch screen

**Primary Data Storage**
5MB of onboard memory (60,000 data points) providing logging once a minute for 45 days.

**Secondary Data Storage**
Up to 64GB data storage for systems fitted with companion data loggers for SMS and remote data access

**Logging Interval**
1 second to 1 hour, user adjustable

**Time Constant**
1 second to 60 seconds

**Dilution System**
10:1 precision dilution system optimized to minimize particle loss and mazimize particle transport

**Thermal Conditioning**
KS-1A advanced thermal conditioning system designed for thermal conditioning prior to sample measurement

**Size Selective Inlets**
Not necessary on this model. The AVT533 simultaneously measures 5 different particle size (PM) fractions and displays these for the user.

**Sheath Air System**
Patended sheath air system and recessed optics to keep the optics clean during sampling

**Power Requirements**
Operates off a single 12 volt, 10Ah NiMH battery. Current draw is 2.0A and this provides typically 5 hours of operation. Charge time is typically 5 hours. Also operates off a 240v AC adapter.

**CE Rating**
Immunity EN61236-1:2006
Emissions EN61236-1:2006

### Included System Components
AVT533 monitor with NEMA 4 enclosure
240 volt battery charger & battery
5m sampling hose & accessory case
Stainless steel exhaust sample probe
User manual & calibration certificate
Case & dryer beads bottle
Software, 2 spare filters & accessories
Full 2 year warranty

**Options & Accessories**
Spare internal battery
SMS & email messaging module
Web based data collection module
Internal shealth air filters
Solar power system
$20 per month web hosting of data
Annual maintenance contract
Annual clean & calibration

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